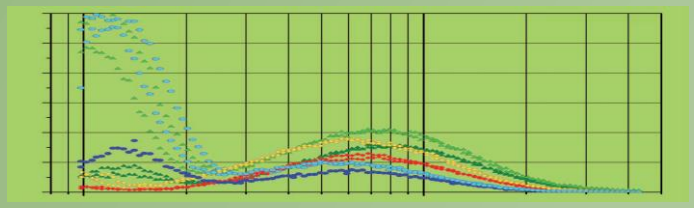
FOCUS-Event NPC 2025 19th June 2025

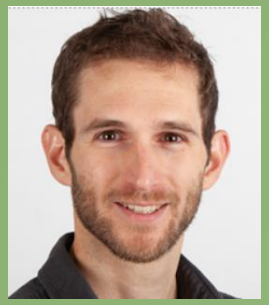
Abstracts on Nanoparticles from Brakes and Tyres



B. Rothen Rutishauser
UNI.FRIBOURG

Non-Exhaust Nanoparticles from Traffic Sources: Health Implications of Brake and Tire Wear Emissions

The physicochemical features and rate of the particles emitted vary depending on some parameters such as the chemical composition of brake discs and pads—classified as non-asbestos organic (NAO), low-metallic (LM), or semi-metallic (SM), and the current reported toxicity is mainly related to the chemical nature of the particles. Also, for tire wear particles, adverse health effects were observed. As for the brake wear particles, *in vitro* and *in vivo* evidence suggest that the metals are important contributors to toxicity, but one major concern for tire abrasions is that microplastic particles may remain airborne for extended periods.



A.J. Bergmann
Swiss Center of ECOTOXICOLOGY

Ecotoxicology of Tire Wear Particles: a Multi-Trophic Survey

Tire and road wear particles (TRWP) are emitted during normal use of automobiles and can enter aquatic environments. Organisms then encounter TRWP and dissolved tire-associated chemicals in the water or after ingesting contaminated material. A pivotal example is the recent discovery of 6PPD-quinone (6PPD-Q), a transformation product of an antiozonant additive. 6PPD-Q is a potent toxicant to coho salmon, and the main contributor to long-observed coho mortality in the western coast of North America. Beyond 6PPD-Q, the complex cocktail of tire-associated chemicals is under scrutiny for potential effects to all levels of aquatic life: from microorganisms to invertebrates to fish.

N. Molden
EMISSIONS ANALYTICS

Chemistry and Physics of Tyre Wear

Globally, over 2.3 billion tires are produced each year, presenting significant challenges for the industry. As vehicles grow heavier, controlling tire wear emissions becomes increasingly critical, while simultaneously managing the growing complexity of chemical additives designed to optimize safety and performance. This presentation will set out the latest understanding the way in which tyre wear in real-world conditions alongside Emissions Analytics' latest research on the chemical profile of original tyres, wear particles and volatile organic compounds that off-gas from the surface of a tyre. Real-world wear rate data will be presented together with chemical source profiles from untargeted, multi-dimensional pyrolysis GC-MS – from over 500 tyres from light, medium and heavy-duty sectors in Europe and the USA.

Status update on the development of a UN Regulation on tyre abrasion perfomance

The UN Regulation will work by determining standardised measurement methods, which will allow for the quantification of the microplastic emissions in the environment. This work is coordinated within a dedicated task force (TF TA) under both the Noise and Tyres (GRBP) and Pollution and Energy (GRPE) working parties. The task force is scheduled to deliver a working document by June 2025 that will serve as the basis for the establishment of the UN Regulation on tyre abrasion. The work delivered at the UN level will support the implementation of the future Euro 7 standards, where abrasion limits for C1 tyres will apply as of July 2028.

V. Franco
EU DG GROW 12

Insight into Particle Formation in Frictional Contacts of Disc Brake Systems

With the introduction of a legal limit for particulate emissions, another important target variable comes into play, and increases pressure for the development engineers. Addressing this challenge requires a deep understanding of the processes taking place in frictional contact, in particular the tribological mechanisms and the generation of particles. This presentation is intended to provide a brief insight into investigations of the frictional contact. They allow the analysis of the effects of rotational speed, brake pressure application and lining ingredients with the goal of optimized friction systems regarding friction performance and particulate emissions.

H. Bacher and K.Kolbeck
BMW AG

Air Quality and Tire Road Wear Particles: Myths and Facts

Michelin has always worked to reduce the environmental impact of tires. Among other important levers such as energy efficiency, longevity and the quantity of materials used, TRWP is a key lever for achieving our objectives. Measuring the quantity and size distribution of TRWP, and in particular small particles (less than 10 µm), is a technical challenge taken up by Michelin. In this presentation, our measurement method will be presented, and our latest results on particle emissions from tires will be discussed and compared with the literature. The presentation will also focus on the question of nanoparticles, and possible ways of further reducing TRWP emissions.

F.Biesse
MICHELIN

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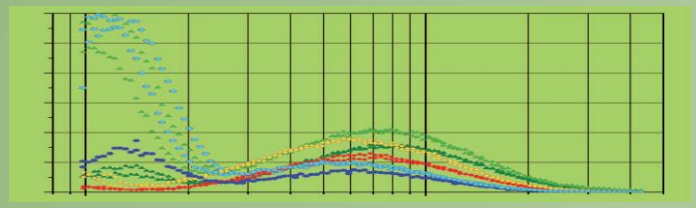
Speakers on Nanoparticles from Brakes and Tyres



PD Dr. Loretta Müller
Chair and Moderator

The more we are able to reduce/avoid the emission of combustion-derived particles, the more important become particles emitted from tyre and brake wear. Therefore, it is of upmost importance to understand how those particles are produced and what their impact on the environment and the human health are. This focus event will give an overview on the impact on the human health and the aquatic system, about the chemistry and physics and legislation of those particles and potential technical solutions.

Prof. Dr. Barbara Rothen Rutishauser
University of Fribourg

Co-Chair of the BioNanomaterials group at the Adolphe Merkle Institute, University Fribourg. She is an expert in the field of cell-nanoparticle interactions, with a special focus on 3D tissue models such as the lung or intestine that can be used to study biological responses and hazard assessment.

Dr. Alan James Bergmann
Swiss Center for Applied Ecotoxicology

received a PhD in Environmental Toxicology from Oregon State University. Since 2017 he has been a research scientist with the Swiss Centre for Applied Ecotoxicology, in the Aquatic Toxicology group in Dübendorf. His work focuses on methods to identify chemical hazards in the environment and in manufactured materials, such as road run-off and tires.

Nick Molden
Emissions Analytics Ltd, CEO

founded Emissions Analytics in 2011 to understand the holistic environmental impact of vehicles on air, soil and water. He is author of *Critical Mass*, a book that proposes radical simplification of car ratings and taxation. He is chairman of the European standardisation CEN Workshop 90 on collecting real driving tailpipe emissions data. Furhtermore, he is an Honorary Senior Research Fellow at Imperial College London.

Dr. Norbert Heeb
Co-Chair of the ETH-Nanoparticle Conference

Welcome to the Focus Event, an important part of the NPC in which we address latest trends in nanoparticle research, technology and politics. It is your chance to discuss with experts what steps can be taken, what technologies and what politics are needed to reduce NP emissions. We all dream of fast mobility that brings as from A to B, but at B, we are happy that we can stop our vehicle again. Thus for once we talk about deceleration and learn what materials and technologies can stop us again with low brake and tyre wear emissions.

Dr. Vicente Franco
EU-Commission; DG GROW.12

is an industrial engineer. Since 2016, he has been working as policy officer at the European Commission, first at the Directorate-General for Environment (Clean Air Unit) on files related to road transport emissions and the effects of air pollution on human health and, since 2022, at the Directorate-General on the implementation of the Euro 7 pollutant emissions standard, particularly on light-duty vehicles, non-exhaust emissions and on-board monitoring (OBM).

Heinz Bacher
BMW AG

Senior Expert on Brake Emission Testing and Test Infrastructure Collaboration in standardization (CEN, DIN) of mobile exhaust measurement systems. Project management of key infrastructure projects, such as low-temperature, high-performance exhaust emission test center and brake emission test center Engagement as a mentor of the Eurobrake Students Opportunity Program for several years

Frederic Biesse
Michelin

After earning a Master of Engineering degree from Central-Supélec, he started to work at Michelin in the numerical analysis domain. He then joined the tire performance analysis team, initially focusing on noise performance, later expanding his expertise to wear and rolling resistance. He became the manager of the tire performance analysis team focused on wear and rolling resistance. Currently, he is a Fellow (expert) in tire physics and performance modeling at the Michelin R&D center in Clermont-Ferrand, France.